

EART 229: Isotopic Methods in Environmental Science

Instructor:

Paul Koch, A250, Office Hours: Th 1:00 - 3:00 PM

Time: M,W 3:30-5:15 E&MS Room D236

Class website: <http://es.ucsc.edu/~pkoch/pages/classes.htm>

Syllabus (download with assignments)

W 1/6 Introduction and Organization

M 1/11 **Notation, Fractionation, and Gear (Paul)**

[PPT of Presentation](#)

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[Notes on Reading](#)

Required Reading

1. [Sharp \(2007\)](#)
2. [Sulzman \(2007\)](#)
3. [Hayes \(2001\): Just read pages 1-6 for now](#)
4. [Schoeller \(1999\)](#)
5. [Mistakes in Schoeller \(1999\)](#)

Supplemental Reading

1. [Hayes \(1993\)](#)
2. [Hayes \(2002\)](#)

W 1/13 **Systematics: Carbon Isotopes in Plants (Paul)**

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[Notes on Reading](#)

Required Reading

1. [Hayes \(2001\): pg. 6-11](#)
2. [O'Leary \(1988\)](#)

Supplemental Reading

1. [Farquhar et al. \(1989\)](#)
2. [Cernusak et al. \(2009\)](#)

W 1/20 **Applications: Carbon Isotopes in Plants (Paul)**

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[Notes on Reading](#)

Required Reading

1. [Ehleringer & Monson \(1993\)](#)
2. [Ehleringer et al. \(1997\)](#)

Supplemental Reading

1. [Still & Powell \(2010\)](#)
2. Diefendorf et al. (submitted)

F 1/22 Systematics: Carbon Isotopes in Soils (Paul)

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[Notes on Reading](#)

Required Reading

1. [Cerling & Quade \(1993\)](#)
2. [Ehleringer et al. \(2000\)](#)

Supplemental Reading

1. [Quade et al. \(1989a\)](#)
2. [Feng et al. \(1999\)](#)
3. [Schweizer et al. \(1999\)](#)
4. [Torn et al. \(2002\)](#) and [Torn et al \(2003\)](#), a correction
5. [Wynn & Bird \(2007\)](#)

F 1/22 Applications: Carbon Isotopes in Soils (Paul)

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[Notes on Reading](#)

Required Reading

1. [von Fischer et al. \(2008\)](#)
2. [Quade et al. \(1989b\)](#)
3. [Fox & Koch \(2003\)](#)

Supplemental Reading

1. [Krull & Skjemstad \(2005\)](#)
2. [Koch et al. \(2004\)](#)
3. [Nordt et al. \(2008\)](#)

M 1/25 Systematic: Carbon Isotopes in Aquatic Plants (Paul)

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[Notes on Reading](#)

Required Reading (READ IN THE ORDER BELOW)

1. [Rau et al. \(1989\)](#)
2. [Laws et al. \(1995\)](#)
3. [Reinfelder et al. \(2000\)](#)
4. [Raven et al. \(2002\)](#)

Supplemental Reading

1. [Goericke et al. \(1994\)](#)
2. [Popp et al. \(1998\)](#)

M 1/25 Application: Carbon Isotopes in Aquatic Plants (Paul)

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[Notes on Reading](#)

Required Reading (READ IN THE ORDER BELOW)

1. [France \(1995\)](#)
2. [Schell \(2000\)](#)
3. [Cullen et al \(2001\)](#)
4. [Schell \(2001\)](#)
5. [Newsome et al. \(2007\)](#)

Supplemental Reading

1. [Simenstad et al. \(1993\)](#)
2. [Rau et al. \(2001\)](#)

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Systematics: Carbon Isotopes in Animals (Gillian)

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[Notes on Reading](#)

Required Reading

1. [Ambrose & Norr \(1993\)](#)
2. [Sponheimer et al. \(2003\)](#)
3. [Howland et al. \(2003\)](#)
4. [Passey et al. \(2005\)](#)

Big Review papers

1. [Koch \(2007\)](#)
2. [Martinez del Rio et al. \(2009\)](#)

Supplemental Reading

1. [Kelly \(2000\)](#)
2. [Fox-Dobbs et al. \(2007\)](#)
3. [Pearson et al. \(2003\)](#)
4. [Jim et al. \(2004\)](#)
5. [Trueman et al. \(2005\)](#)

W 1/27

Applications: Carbon Isotopes in Animals (Rachel O.)

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[Notes on Reading](#)

Required Reading

1. [O'Brien et al. \(2002\)](#)
2. [MacFadden et al. \(1999\)](#)
3. [Miller et al. \(2005\)](#)

F 1/29 **Calcium Isotopes in Plants and Animals (Cheryl)**

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[Notes on Reading](#)

Required Reading

1. [Skulan & DePaolo \(1999\)](#)
2. [Weigand et al. \(2005\)](#)
3. [Heuser & Eisenhauer \(2010\)](#)

Supplemental Reading

1. [DePaolo \(2004\)](#)
2. [Page et al. \(2008\)](#)
3. [Clementz et al. \(2003\)](#)
4. [Chu et al. \(2006\)](#)
5. [Skulan et al. \(2007\)](#)

F 1/29 **Strontium Isotopes in Plants and Animals (Corey)**

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[Notes on Reading](#)

Required Reading

1. [Capo et al. \(1998\)](#)
2. [Blum et al. \(2002\)](#)
3. [Hoppe et al. \(1999\)](#)
4. [Kennedy et al. \(2002\)](#)

Supplemental Reading

1. [Blum et al. \(2001\)](#)
2. [Feranec et al. \(2007\)](#)

M 2/1 Systematics: Nitrogen Isotopes in Animals (Tim)

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[Notes on Reading](#)

Required Reading

1. [Koch \(2007\): 109-113](#)
2. [Martinez del Rio et al. \(2009\): V3 and V5](#)
3. [Murphy & Bowman \(2006\)](#)

Supplemental Reading

1. [Kelly \(2000\)](#)
2. [Vanderklift & Ponsard \(2003\)](#)
3. [Roth & Hobson \(2000\)](#)
4. [Sponheimer et al. \(2003a\)](#)
5. [Sponheimer et al. \(2003b\)](#)
6. [Pearson et al. \(2003\)](#)

M 2/1 Applications: Nitrogen Isotopes in Animals (Sarah&Sharon)

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[Notes on Reading](#)

Required Reading

1. [Oelbermann & Scheu \(2002\)](#)
2. [Gaye-Siessegger et al. \(2004\)](#)
3. [Fuller et al. \(2004\)](#)
4. [Fuller et al. \(2005\)](#)
5. [Newsome et al. \(2006\)](#)

Supplemental Reading

1. [Polischuk et al. \(2001\)](#)
2. [Gaye-Siessegger et al. \(2007\)](#)
3. [Hatch et al. \(2006\)](#)

W 2/3 Isotopes in Individual Organic Compounds

(Natasha & Paul on C; Matt McCarthy on N)

[Carbon PPT Presentation](#)

[Carbon PDF Presentation](#)

[Nitrogen PPT Presentation](#)

[Nitrogen PDF Presentation](#)

[Notes on Reading](#)

Required Reading

1. [Evershed \(2007\)](#)
2. [McClelland & Montoya \(2002\)](#)
3. [Larsen et al. \(2009\)](#)
4. [Lorrain et al. \(2009\)](#)

Supplemental Reading

Background & Fractionations

1. [Abelson & Hoering \(1961\)](#)
2. [Hare et al. \(1991\)](#)

3. [Howland et al. \(2003\)](#)
4. [Jim et al. \(2003\)](#)
5. [Jim et al. \(2004\)](#)
6. [Jim et al. \(2006\)](#)
7. [McCullough et al. \(2008\)](#)
8. [Styring et al. \(2009\)](#)

Ecology and Oceanography

1. [Chamberlain et al. \(2006\)](#)
2. [Loick et al. \(2007\)](#)
3. [McCarthy et al. \(2007\)](#)
4. [Popp et al. \(2007\)](#)
5. [Roland et al. \(2008\)](#)
6. [Hannides et al. \(2009\)](#)

F 2/5 Nitrogen Isotopes in Aquatic Plants (Angela)

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[Notes on Reading](#)

Required Reading

1. [Michener & Kaufman \(1994\)](#): pages 248-252
2. [Montoya \(2007\)](#)
3. [Altabet et al. \(1999\)](#)

Supplemental Reading

1. [Rau et al. \(1998\)](#)
2. [Voss et al. \(2001\)](#)
3. [Rau et al. \(2003\)](#)
4. [Lepoint et al. \(2004\)](#)

F 2/5 Nitrogen Isotopes in Soils and Land Plants (Dena)

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[Notes on Reading](#)

Required Reading

1. [Evans \(2001\)](#)
2. [Evans \(2007\)](#)
3. [Pardo & Nadelhoffer \(2010\)](#)

Supplemental Reading (read abstracts for everything except Hogberg)

1. [Taylor et al. \(2003\)](#)
2. [Nasholm et al. \(1998\)](#)
3. [Hobbie et al. \(1999a\)](#)
4. [Hobbie et al. \(1999b\)](#)
6. [Swap et al. \(2004\)](#)
7. [Craine et al. \(2009\)](#)
8. [Hogberg \(1997\)](#)

M 2/8 Systematics: Oxygen&Hydrogen Isotopes in Plants (Pratigya)

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[Notes on Reading](#)

Required Reading

1. [Sternberg \(1989\)](#)
2. [Marshall et al. \(2007\)](#): 39-49
3. [Helliker & Ehleringer \(2000\)](#)

Supplemental Reading

1. [Yakir \(1992\)](#)
2. [Sternberg \(2009\)](#)

M 2/8 Applications: Oxygen&Hydrogen Isotopes in Plants (Guangsheng)

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[Notes on Reading](#)

Required Reading

1. [Dawson \(1993\)](#)
2. [Sternberg \(1989\)](#)
3. [Helliker & Richter \(2008\)](#)
4. [Woodward \(2008\)](#) (News and Views Piece on Helliker & Richter (2008))

W 2/17

Systematics: Oxygen&Hydrogen Isotopes in Animals (Nadine)

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[Notes on Reading](#)

Required Reading

1. [Kohn & Cerling \(2002\)](#): selected section (see notes on reading)
2. [Podlesak et al. \(2008\)](#)
3. [Ehleringer \(2008\)](#)

Supplemental Reading

1. [Kohn \(1996\)](#)
2. [Bowen et al. \(2009\)](#)

W 2/17

Applications: Oxygen&Hydrogen Isotopes in Animals (Karthik)

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[Notes on Reading](#)

Required Reading

1. [Kohn & Cerling \(2002\)](#): selected section (see notes on reading)
2. [McKechnie et al. \(2004\)](#)
3. [Clementz et al. \(2006\)](#)
4. [Solomon et al. \(2009\)](#)

Supplemental Reading

1. [Clementz & Koch \(2001\)](#)
2. [Hobson et al. \(2004\)](#)
3. [Chesson et al. \(2010\)](#)

F 2/19 Turnover (Paul)

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Required Reading

1. [MacAvoy et al. \(2006\)](#)
2. [Cerling et al. \(2007\)](#)

Supplemental Reading

1. [MacAvoy et al. \(2005\)](#)
2. [Martinez del Rio & Sprecher \(2008\)](#)

F 2/19 Mixing Models (Justin)

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Required Reading

1. [Phillips & Koch \(2002\)](#)
2. [Moore & Semmens \(2008\)](#)

M 2/22 **Marine Ecology (Susy)**

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Required Reading

1. [Wallace et al. \(2009\)](#)
2. [Newsome et al. \(2009\)](#)
3. [Jennings \(2008\)](#)

M 2/22 **Marine-Terrestrial Coupling (Walter)**

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Required Reading

1. [Mertz & Moyle \(2006\)](#)
2. [Ben-David et al. \(2004\)](#)
3. [Aguilar et al. \(2008\)](#)
4. [Foley & Koch \(in press\)](#)

W 2/24 **Terrestrial Ecology(Emma)**

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Required Reading

1. [Darimont et al. \(2007\)](#)
2. [Martinez del Rio et al. \(2009\)](#)
3. [Leonard et al. \(2007\)](#)
4. [Badgley et al. \(2008\)](#)

W 2/24 **Migration (Rachel B.)**

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Required Reading

1. [Hobson et al. \(2010\)](#)
2. [Finney et al. \(2002\)](#)
3. [Cerling et al. \(2009\)](#)

Supplemental Reading

1. [Norris et al. \(2004\)](#)
2. [Britzke et al. \(2009\)](#)

M 3/1 **Keystone Species (Scott)**

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Required Reading

1. [Croll et al. \(2005\)](#)
2. [Dawson \(1998\)](#)
3. [Wolf & del Rio \(2003\)](#)

M 3/1 **Parasitism-Symbiosis (Biao)**

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Required Reading

1. [Marshall et al. \(1994\)](#)
2. [Muscatine et al. \(1989\)](#)
3. [Spero & Lea \(1993\)](#)

Supplemental Reading

1. [Bannister & Strong \(2001\)](#)
2. [Alamaru et al. \(2009\)](#)